REMARKS

The Official Action has been carefully considered and the Examiner's comments are duly noted. Reconsideration of this Application in light of the Amendment of the Claims and the Remarks submitted is respectfully solicited.

This Response takes into consideration the Examiner's comments in the Official Action of January 21, 2003 and February 12, 2003. It is considered that the Supplemental Official Action extended the date from February 12, 2003 to May 12, 2003 so that no additional fees are necessary for an extension. If for some reason extension fees are necessary, our Deposit Order Account No. 10-0100 may be charged.

The Claims have been amended so as to bring out certain features which are believed to have been evident previously, but were amended for the sake of emphasis.

Applicant also wishes to point out that this technology provides for a significant advance in this particular art.

This new technology is an improvement over the prior art known to the Applicant, because in a large number of individual instances, cycle times can be significantly reduced and, because the die has essentially a closed coolant system, and it is that the life of dies might be increased from lives of perhaps one or two years in a typical instance to perhaps 10 to 20 years.

The Examiner's analysis of the newly cited reference Cavazos U.S. Patent No. 5,167,688 has been considered, but Applicant's analysis bears the question as to operability. While Applicant's attorney is aware that even though a patent may disclose a device which is not operable, such device can be used for prior art purposes.

Nevertheless, while the structure or the alleged method of operation which can be used for prior art purposes, but such should not be used to compare operability or results and for intended use, there should be some teaching in Cavazos that the Cavazos disclosure does or can do what the present Application teaches. Where alternative methods are taught, there must be some assurance that they are technically correct and result in operability. Claims in this Application are directed to a method, and therefore, arguments that the operability of Cavazos is in order and specifically, it is the opinion of the inventor that Cavazos would simply not work at all. Whether Cavazos structure could be made operable is questionable.

It should be noted that the present invention is directed to plastics and related material. Cavazos is not, nor is it contemplated by Cavazos.

It is clear that Cavazos disclosure is directed to glass moulding and appears to be wanting to control selectively the temperature of various parts of the die by using these specific blind bores. In fact, in this narrow technology, it can also be considered non-related and because the problems are completely different the present invention teaches totally against vertically orientated line bores because to rely upon liquid to vapor conversion, the passage of rising vapor has to have a free passageway so that a mere bore, which it is believed presumes a relatively small diameter, means that a liquid to vapor conversion system would simply not work or at least not work or be operable in any way that would make any technological sense.

With regard to Cavazos, and the argument that the Applicant does not believe it is operative, clearly, this would apply to the method claims. With respect to the mould claims, while the structure of Cavazos has been applied, the mould claims have

been amended so that the structure does now distinguish further from Cavazos. The structure was previously considered to distinguish over Cavazos, but in view of the citation of Cavazos, the article claims were amended further to bring out the distinctions between the present invention and Cavazos.

With respect to the Amendments for the Claims, the Examiner's attention is specifically directed to page 4, lines 19-20, which provides the basis for a closed chamber and the amendment for a completely closed chamber. With respect to lines 30-34 of page 4, this provides a clear basis that any extraction takes place through a pump and therefore a further justification for the amendment. Page 4, lines 22-25 provide for a closed system, and lines 7-9 of page 11 provides for keeping the same liquid through the full cooling process so that it is not expected that there will be any mineral deposit or significant corrosion. Clearly, this is a feature that has nothing to do with glass and therefore further teaches away from Cavazos and is directed to the features of the present invention.

Further, Claim 21 is further patentable because it is directed to plastics material.

Claim 22 is further patentable because it is directed to the casting of metals.

Claim 23 is further patentable because it is directed to the injection moulding of plastic material.

Claim 24 is further patentable because it is directed to the moulding by thermal forming of plastic materials.

Claims 25 to 27 are allowable for the same reasons as Claim 18 and has been amended in a similar manner.

Claims 28 and 29 are allowable for the same reasons as Claim 25 because they are dependent on Claim 25.

Claim 30 is further patentable because it is directed to a heating means located within the chamber, a feature not disclosed nor suggested nor taught by Cavazos.

Claim 31 is further patentable because the cooling means includes a tube and a core in the tube with means to direct cooling water through the tube, and this is not shown nor suggested nor taught by Cavazos.

Applicant again further wishes to point out that Cavazos' is directed solely to a glass bottle whereas the present invention is directed to plastics and other related materials which are different from and have different problems from glass bottles.

Specifically, plastic injection dies have had chambers cut throughout which receive cooling water which cools the relevant parts of the die by passing through these galleries in the adjacent vicinity of the various heated parts, capturing some heat on the way and exiting subsequently still as liquid with however an elevated temperature.

A number of problems arise in designing a die using this system. Clearly, a careful analysis of Cavazos indicates that none of the problems dealt with by the present invention is dealt with by Cavazos.

The amount of cooling is conditioned by the rate at which heat can be transferred to the liquid and clearly, liquid that is introduced at a beginning of the die will be cooler than that liquid when the liquid exits.

This means implicitly that the liquid contacting various parts of the die will be at different temperatures and therefore have different transfer rates.

It has been the job and object of die designers to ensure that cooling water will meet various parts of the die during its moulding and cooling process for a best effect, which then determines the so-called cycle time.

It is to be understood that the cycle time is very critical because if a very expensive die might produce a part and allows the part to cool to a stage where the part can be safely removed from the die in say 30 seconds, and one is able to decrease the cycle time by 15 seconds, then one can technically produce twice as many parts with the same capital investment, a clear savings, and therefore a clear reason to overcome 35 U.S.C. ¶102.

In other words, even relatively small improvements in the cycle time can be very important as far as economic and profitable returns are concerned. For example, when the hood of an automobile was made in two parts, and an invention was made to make the hood of a motor vehicle in one part without a center, joining strip and the saving was just under one dollar, with four million and, perhaps over eight million motor vehicles, the savings is considerable and in the millions.

The second difficulty with conventional technology is that if fresh water is continuously directed through the die, implicitly then, such fresh water will continually reintroduce available oxygen within the cooling galleries of a die and promote rust. Clearly, a result one would like to avoid, if not eliminate.

It is possible, however, to use exotic metals to at least reduce this problem but the use of exotic metals or sophisticated coating technologies carry very heavy costs of their own and are by no means an obvious or economic solution.

The present invention provides answers to both of these above problems in an amazingly simply way.

It arises from the simple appreciation that a liquid will boil at a temperature which is determined by its "atmospheric" pressure.

The applicant would like to present the following which may be helpful to explain this. For example, if a climber climbs a very high mountain, the atmospheric pressure at such a high level is significantly less than at say sea level and the temperature therefore of boiling water at such high altitudes is very much less.

However, the boiling temperature is constant at a given vapor pressure, so that let us say the vapor pressure is half that on the top of the mountain than it is at sea level, then there will be an appropriate reduction in the temperature at which that liquid boils.

What the present invention teaches and does therefore, is to put some water into the closed cooling chambers of the mould and therefore reduces the gaseous pressure above that liquid within the chambers so that as much as possible of the air is extracted from the galleries.

It will be evident that now we have water as the typical material which will now boil at a temperature which is determined by that extent of reduction in pressure on the water.

At this stage, the Examiner is respectfully asked to note that when a liquid is boiled, the temperature will stay constant. Latent heat is added and inserted into the boiling liquid until effectively all of the liquid is completely boiled off, after which the vapor itself will then increase in a direct response to the further heat that is being supplied.

It should further be noted that if the mould is designed so that a significant portion of the internal surface (i.e., the outer surface of the condenser) can be maintained at a preferred temperature, then the rest of the mould will be automatically maintained at that preferred temperature by the following mechanism.

Input of heat to any other internal surface which is in contact with liquid will cause that liquid to vaporize at that surface, converting the heat to latent heat of vaporization and creating an increase in vapor pressure in the adjacent area. This creates a pressure gradient which causes vapor to flow toward the condenser where it gives up that latent heat of vaporization to the outer surface of the condenser. This process will continue until all of the input heat has been transferred to and disposed of by the condenser.

The beautiful result therefore is that once the temperature of the condenser surface has been set, then a constant temperature profile inside the mould is established. By designing the mould so that the distance between the moulding surface and the liquid is as constant as practical (i.e., the shape of the cooling chamber follows the shape of the moulding) the desirable objective of a constant temperature profile across the moulding surfaces is achieved.

Further, because when liquid is vaporized, it will take a large quantity of heat energy without significantly changing its temperature, so that there is relatively constant temperature throughout the die.

Also, however, it does appear to be a very efficient way to extracting heat because the liquid once boiled creates a vapor which is arranged to be self-removing so that there is not an interface between the cooling material and the hot metal that might self limit the exchange.

A couple of features ensure that this process works most reliably and a first is that the general cooling galleries within a die where the chambers or galleries are either in themselves big enough toe permit counter flows, e.g. rising vapor as compared to returning condensed liquid or there is a specific passage way allowing for this transporting of the liquid.

The transporting itself is caused naturally simply by vaporizing and cooler liquid falling, but if there is a narrow chamber, the cooled liquid might be blocked by the rising vapor.

It is not so much then that the process wouldn't be working at all but it works much more efficiently where some parts of the die are permitting the returning of the condensed water.

Another feature of course is that with rising vapor, this does need to be condensed, where the heat carried by the vapor itself is then extracted and while this can be achieved by any manner of condenser, in the present specific case (this Application), there is a simple straight through water conduit which does in fact allow for some

external control of the system but in practice, such a condenser is simplicity itself by having simply a straight through conduit that can be located to pass through an upper area of the cooling gallery and is there simply to permit sufficient cooling to ensure that a reasonable heat extraction and therefore condensation of the vapor occurs.

In summary then, the present Application proposes a closed system in which the gaseous pressure within the chamber and the liquid chosen is such that the transition temperature from liquid to vapor is as low as practical that at which it is desired to have cooling effected and the temperature maintained within the various parts of the die and there are means to effect some condensation of the vapor subsequent to its conversion from liquid and effectively a return path for condensed liquid which will not get blocked by rising vapor.

Clearly, the advantages of this system is that it allows for a closed cooling system almost entirely, the only exception is that the condenser can be cooled by external water supply but because this can be easily maintained or replaced at very low cost, it is of negligible consequence.

Secondly, because the closed system has its vapor pressure defined by the temperature of the condenser, the transition temperature will ensure that the die will be subjected to constant cooling at around about that temperature.

The result is that it allows for huge flexibility in now designing dies to incorporate this principle and in practice is providing for very significant reduction in cycle times.

Thirdly, because the complex galleries are no longer subjected to external oxygenated water on a continuing basis, it is much easier and less expensive to ensure that dies can have now a very long life without maintenance.

Having now stepped through carefully, the fundamental principles of the present invention, it is worth looking now at what Cavazos is doing, and why the Applicant believes that and submits that Cavazos is inoperable and clearly does not do nor accomplish what is disclosed and claimed in the present Application.

We find it quite difficult to understand how Cavazos expects this process to work.

Looking at either Figure 1 or Figure 2 of Cavazos, there is shown a blind hole or bore which is defined as being vertically orientated at 14, and then there is a conduit which feeds into an uppermost manifold 16, and there is a further lead off from this manifold to a condenser 20 and finally there is a bleed valve 26 which is electronically controlled.

As best understood, a bleed valve is not a one-way valve, and can allow air to enter the system, and therefore Cavazos does not teach nor disclose a completely closed system.

Why it is confusing and does not teach what Applicant does, is that if one looks at column 1 lines 46 through 50, it states "I have since discovered that the most efficient cooling is when the heat of the mould is transferred not to a liquid, but to a vapor which is in contact with the walls of the plurality of blind bores."

However, his drawings, that is figures 1 and 2, show these blind bores and the fittings above this to be filled with liquid.

It is now necessary to say that if the system is simply working with a heat transfer to vapor, then this is totally different to anything this invention contemplates.

However, even though these tubes are shown as being filled with liquid, there is a quite fundamental problem with this construction which is to say that if vapor is being formed in the blind tube, then this will implicitly rise and technically will effectively stop any counter flow of liquid back into the blind hole.

This principle of using a so-called vapor lift system is relatively well known and is often used for instance in coffee percolators.

From a practical point of view then, unless Cavazos can get liquid back into the blind hold, he can't have anything to convert or if he does, the amount of minor spray that might trickle back would be so quickly vaporized that his initial description, which is to say the thing works by direct transfer of heat to vapor, is probably how it is seen to actually operate in practice.

Cavazos, however, also differs because it does not appear to describe a closed system in which there is any defined evacuation state but rather there is this variably controlled bleed valve which seems somehow to be intended to control the temperature.

While Cavazos has a condenser, and it is connected through a conduit to a head space above the liquid as shown at least, it is hard to ascertain whether this condenser could ever hope to be effective again because all of the vapor is intended to be

directed through a single conduit up into the condenser which is therefore converting the vapor to condensed liquid.

It therefore would appear and Applicant strongly suggests that Cavazos does not teach the use of the same cooling system proposed by the teachings of the present invention. Not only is the structure as claimed different, the operating system is also different.

If there are any points outstanding, the Examiner's is respectfully asked to call Applicant's attorney in order to do what is necessary to place the Application into condition for allowance.

With respect to the rejection of 35 U.S.C. ¶112, Claim 31 has been further amended as to make reference to the internal cooling arrangement.

With respect to Claim 30, it is believed that the Examiner has meant Claim 31. If Applicant's attorney's understanding is incorrect, the Examiner is asked to call the undersigned to further amend Claim 30.

Claims 18-20 and 25-29 were rejected under 35 U.S.C. ¶102(b) as being anticipated by Cavazos, and it is respectfully submitted that the above argument explains why these Claims are patentable over Cavazos.

Claims 21-24 and 30 were rejected as obvious under 35 U.S.C. ¶103(a) and the arguments made above, it is respectfully submitted meet the objections noted under 35 U.S.C. ¶103.

With respect to the prior art made of record and not applied to the Claims, such prior art has been considered, and the Claims now presented are considered to

distinguish patentably over such prior art taken either singularly or combined in any valid combination, and it is further respectfully submitted the Claims now in this Application clearly and patentably distinguish from all of the prior art known to the Applicant as both his attention by the Examiner.

If there are any points outstanding, the Examiner is asked to call Applicant's attorney to do what is necessary to place the Application into condition for allowance.

Respectfully submitted,

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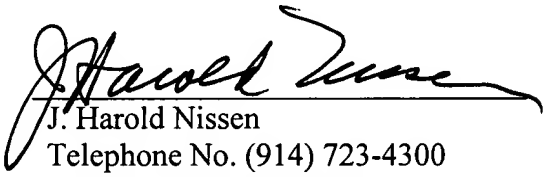
By: 

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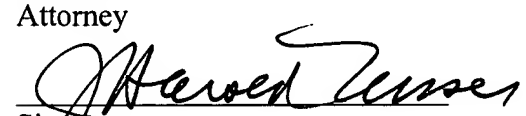
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Notice of References Cited	Application/Control No. 09/719,136	Applicant(s)/Patent Under Reexamination JAMES, MALCOLM BARRY	
	Examiner Emmanuel S. Luk	Art Unit 1722	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
	A	US-5167688	12-1992	Cavazos	65/83
	B	US-			
	C	US-			
	D	US-			
	E	US-			
	F	US-			
	G	US-			
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FOREIGN PATENT DOCUMENTS

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